

## SOCIAL BEHAVIOR OF CAPTIVE FLEDGLING AMERICAN KESTRELS (*FALCO SPARVERIUS*)

NICOLANTONIO AGOSTINI

*Via Carlo Alberto n.4, 89046 Marina di Gioiosa Jonica (RC), Italy*

DAVID M. BIRD AND JUAN J. NEGRO

*Department of Natural Resources Sciences, McGill University (Macdonald Campus) 21, 111 Lakeshore, Ste-Anne-de-Bellevue, PQ Canada H9X 3V9*

**KEY WORDS:** *Falco sparverius*; American kestrel; fledgling; captivity; social behavior.

Adult American kestrels (*Falco sparverius*) are highly territorial both on their summer and winter grounds (Smallwood 1987, 1988, Palmer 1988). Sexual segregation of wintering kestrels by habitat has also been reported (Koplin 1973, Mills 1976, Smallwood 1987). Young kestrels already show reversed sexual size dimorphism at fledging, with females being larger than males (Negro et al. 1994). Although adults are aggressive to conspecifics, juveniles are extremely social and brood members engage in social hunting (Varland and Loughin 1992). Juveniles of both sexes gather in groups before fall migration (Cade 1955) indicating that young kestrels may have behavioral mechanisms to integrate in groups. This paper describes the social behavior of captive fledgling American kestrels during the post-fledging dependence period.

### METHODS

We examined social interactions within three American kestrel families. Each family was composed of two parents and four young, with sex ratios as follows: 3 females and 1 male in family 1 (FG1); 1 female and 3 males in family 2 (FG2); and 2 females and 2 males in family 3 (FG3). The birds were housed in the same aviary where breeding had taken place (2.00 × 1.30 × 2.00 m) at the Avian Science and Conservation Centre of McGill University, Quebec, Canada. Kestrels were maintained at natural photoperiod and temperature, and food consisted of seven 1-d-old cockerels for each family given at the beginning of each daily observation session.

During observation sessions, behaviors of kestrels were recorded through one-way windows on one side of the aviary. For individual identifications, legs of young were marked with different colors using waterfast color markers. Observations started when all young in each nest had fledged. A total of 90 h (30 h per family) of observations was recorded following a rotating schedule during morning and afternoon hr from 4–19 July 1994.

Ten different behaviors were recorded: **approach** (AP), a close approach by kestrel that caused a response by another kestrel; **displacement** (DI), a close perching between two kestrels that resulted in pushing of one kestrel by the other; **threat** (TH), an approach by an individual stretching out its neck emphasizing its bill which may be slightly open; **curtsey** (CU), (see Mueller 1971); **physical**

**contact** (PC), a touch by an individual by another with its bill or talon; **bill-bill interaction** (BB), a reciprocal contact with the bills; **allopreening** (AL), a rubbing of the bill of one kestrel against the feathers or talons of another kestrel; **aggression** (AG), a strike by an opponent bird with the bill or talon; **crouching** (CR), a posture in which an individual remains crouched on the ground or on the perch keeping the wings slightly detached from the body, at times in contact with another individual; and **piracy** (PI), a kestrel steals food from another kestrel.

### RESULTS AND DISCUSSION

During the first wk after leaving the nest, fledglings stayed on the floor of the aviary, frequently trying to take flight and to climb up the sides. They often landed on other siblings. Fledglings succeeded in reaching perches in the aviary at the beginning of the second wk post-fledging. During the first wk, they roosted on wooden planks at the bottom of the side walls and on a plank found in the center of the aviary.

A total of 962 interactions among fledglings was observed (271 in FG1, 406 in FG2, and 285 in FG3). In all family groups, AL was observed most frequently (Table 1) and sometimes performed in a very exaggerated form as observed by Trollope (1971) and Csermely and Agostini (1993). Curtseying as described by Mueller (1971) was observed only once when a female in FG1 performed this display toward the young male crouched on the floor of the aviary.

Males performed several displays significantly more often than the females: AG ( $\chi^2 = 12.56, P < 0.01$ ), DI ( $\chi^2 = 8.58, P < 0.01$ ), BB ( $\chi^2 = 17.82, P < 0.01$ ), and PC ( $\chi^2 = 5.22, P < 0.05$ ). Females, on the other hand, crouched more often ( $\chi^2 = 5.68, P < 0.05$ ). Besides displaying AG more frequently than the females, males were also subjected to that behavior more often than expected ( $\chi^2 = 8.90, P < 0.01$ ). Aggression between females was observed only 15 times and young males appeared to be more aggressive toward other males. However, aggression never resulted in injury and the attacked bird escaped in 9 cases. Greater aggression by young males might be related to different sex roles of males and females later in life. Adult males are very active in defending nest areas from intruding males. Conversely, females engage in little defense (Palmer 1988).

Fledgling American kestrels seem to be suited to living in groups during the post-fledging period, even in captivity. Allopreening may have had an important role in controlling agonistic behavior, since it may help to keep aggression levels low in family groups. It may ensure that,

Table 1. Frequency of allopreening (AL), threatening (TH), aggression (AG), displacement (DI), bill-bill interaction (BB), physical contact (PC), piracy (PI), crouching (CR), approach (AP), and curtsy (CU) behaviors in three captive American kestrel families (FG1, FG2 and FG3).

FAMILY GROUP	BEHAVIORS									
	AL	TH	AG	DI	BB	PC	PI	CR	AP	CU
FG1	129	18	26	8	34	9	3	25	18	1
FG2	135	34	67	45	80	14	3	3	25	0
FG3	102	20	22	17	68	26	1	18	11	0

when aggression occurs, serious injuries do not occur (Trollope 1971, Harrison 1965, Forsman and Wight 1979, Csermely and Agostini 1993).

Other behaviors may serve other social functions. Bill to bill interactions may facilitate trials of strength or serve as a means of individual recognition as has been suggested for captive common barn-owls (*Tyto alba*) (Csermely and Agostini 1993). Crouching may also be used for individual recognition but it seems more likely to be a posture of submission. This display was shown more frequently by females that rarely showed aggression toward other females. In free living birds, displays of this sort that control aggression among fledglings might encourage the persistence of the family nucleus in the nest area and enhance the formation of juvenile flocks (Cade 1955).

RESUMEN.—Aunque los adultos de la especie *Falco sparverius* muestran agresividad para conespecíficos, los juveniles son extremadamente sociales. Este estudio entrega información sobre la conducta social de volantes cautivos en el núcleo familiar durante el período de dependencia post-volanteo. Nuestras observaciones sugieren que *F. sparverius* le "agrada" vivir en grupo, aunque en un claro contexto no natural, donde ellos controlan sus conductas agonísticas. Los machos juveniles son más agresivos que las hembras juveniles, una conducta que puede estar relacionada con diferentes roles sexuales en su vida posterior.

[Traducción de Ivan Lazo]

#### ACKNOWLEDGMENTS

We are greatly indebted to Ian Ritchie and Mark Adam of the Avian Science and Conservation Centre for their help, and to Gary Bortolotti and Julie Heath for their useful comments on the manuscript.

#### LITERATURE CITED

CADE, T.J. 1955. Experiments on winter territoriality of the American kestrel. *Wilson Bull.* 67:5-17.

CSERMELY, D. AND N. AGOSTINI. 1993. A note on the social behaviour of rehabilitating wild barn-owls (*Tyto alba*). *Ornis Hung.* 3:13-22.

FORSMAN, E.D. AND H.M. WIGHT. 1979. Allopreening in owls: what are its functions? *Auk* 96:525-531.

HARRISON, C.J.O. 1965. Allopreening as agonistic behaviour. *Behaviour* 24:161-208.

KOPLIN, J.R. 1973. Differential habitat use by sexes of American kestrels wintering in northern California. *Raptor Res.* 7:39-42.

MILLS, G.S. 1976. American kestrels sex ratios and habitat separations. *Auk* 9:740-748.

MUELLER, H.C. 1971. Displays and courtship of the sparrowhawk. *Wilson Bull.* 83:249-254.

NEGRO, J.J., A. CHASTIN AND D.M. BIRD. 1994. Effect of short-term food deprivation on growth of hand-reared American kestrels. *Condor* 96:749-760.

PALMER, R.S. 1988. Handbook of North American birds. Vol. 5, Diurnal raptors. Yale Univ. Press, New Haven, CT U.S.A.

SMALLWOOD, J.A. 1987. Sexual segregation by habitat in American kestrels wintering in south central Florida: vegetative structure and responses to differential prey availability. *Condor* 89:842-849.

———. 1988. A mechanism of sexual segregation by habitat in American kestrels (*Falco sparverius*) wintering in south central Florida. *Auk* 105:36-46.

TROLLOPE, J. 1971. Some aspects of behaviour and reproduction in captive barn-owls (*Tyto alba alba*). *Avic Mag.* 77:117-125.

VARLAND, D.E. AND T.M. LOUGHIN. 1992. Social hunting in broods of two and five American kestrels after fledgling. *J. Raptor Res.* 26:74-80.

Received 4 February 1996; accepted 15 September 1996